

BS

implanting in predetermined regions of the substrate a chemical species at a concentration which increases the rate of oxidation of the substrate, wherein the chemical species comprises neon or helium; and

growing a silicon oxide layer of non-uniform thickness by oxidizing the surface of the substrate; and

forming a MOS transistor at the regions of the substrate having the silicon oxide layer.

---

Claims 1 and 7 set forth above are clean versions of the amended claims. A marked-up copy of the amended claims is provided as an attachment to this response.

**Response to Office Action Mailed December 3, 2001**

**A. Claims in the Case**

Claims 1-16 have been rejected. Claims 1 and 7 have been amended. Claims 2, 8, 10, and 13 have been canceled without prejudice. Claim 17 has been added. Claims 1, 3-7, 9, 11-12, and 14-17 are pending in the case.

**B. The Claims Are Not Indefinite Pursuant To 35 U.S.C. §112, Second Paragraph**

Claims 1-16 were rejected under 35 U.S.C. § 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. Claims 1 and 7 have been amended for clarification. Applicant submits that all

the claims are now definite.

**C. The Claims Are Not Anticipated Pursuant To 35 U.S.C. §102**

The Examiner rejected claims 1-11 and 13-16 as being unpatentable over U.S. Pat. No. 5,215,934 to Tzeng (hereinafter “Tzeng”) under §102(b). To anticipate a claim of a patent, a single prior source must contain all the claimed essential elements. *Hybritech, Inc. v. Monoclonal Antibodies, Inc.*, 802 F.2d 1367, 231 U.S.P.Q. 81, 91 (Fed.Cir. 1986); *In re Donahue*, 766 F.2d 531, 226 U.S.P.Q. 619, 621 (Fed.Cir. 1985). Applicant respectfully disagrees that claims 1-11 and 13-16 are anticipated by Tzeng.

Amended claim 1 recites in part “implanting in predetermined regions of the substrate a chemical species at a concentration which increases the rate of oxidation of the substrate, wherein the chemical species comprises neon or helium.” Tzeng teaches that “[a]ntimony, argon, arsenic, and boron, or any one of the group III-IV dopants, have proven effective for enhancing oxidation rates in silicon.” (Column 6, lines 5-8). Applicant submits that Tzeng does not appear to teach or suggest implanting neon or helium atoms in a silicon substrate.

**D. The Claims Are Not Obvious Pursuant To 35 U.S.C. §103(a)**

The Examiner rejected claim 12 under 35 U.S.C. §103(a) as being unpatentable over Tzeng. Applicant submits that claim 12 is patentable over Tzeng for at least the reasons cited above.

Furthermore, portions of the aforementioned rejection appear to be set forth in facts within the personal knowledge of the Examiner and therefore Applicant believes MPEP 2144.03

Halimaoui, et al.  
09/744,877

will apply. Pursuant to MPEP 2144.03, Applicant respectfully requests the Examiner to provide support for his assertion either by an affidavit or by references brought to the Applicant's attention. Otherwise, Applicant requests this rejection be removed. *See, e.g., MPEP 2143.01.*

Accordingly, Applicant submits that all pending claims are not obvious in view of the references cited by the Examiner.

**E. Conclusion**

Based on the above, Applicant submits that the pending claims are in condition for allowance. Favorable reconsideration is respectfully requested.

If any extension of time is required, Applicant hereby requests the appropriate extension of time. If any fees are omitted or if any additional fees are required or have been overpaid, please appropriately charge or credit those fees to Conley, Rose & Tayon, P.C. Deposit Account Number 50-1505/5310-03000/EBM.

Respectfully submitted,



Mark R. DeLuca  
Reg. No. 44,649

CONLEY, ROSE & TAYON  
P.O. BOX 398  
AUSTIN, TX 78767-0398  
(512) 703-1423 (voice)  
(512) 703-1250 (facsimile)

Date: 3/4/02

**Marked-Up Copy of the Amended Specification Showing Changes Made**

**Paragraph starting on page 2, line 5**

To remedy the drawbacks of the above masking process, a process has recently been proposed in which a non-uniform thickness oxide layer is grown in a single step. This process includes forming, on the surface of the substrate, predetermined regions having an oxidation rate reduced by nitrogen ion implantation in these predetermined regions, at points where it is desired to obtain a thinner oxide layer, and then ~~in~~ growing a silicon oxide layer by oxidation of the surface of the silicon substrate. Such a process is described, ~~other others~~, in the article "Formation of Ultrathin Nitrided  $\text{SiO}_2$  Oxides by Direct Nitrogen Implantation into Silicon", by H.R. Soleimani, B.S. Doyle and A. Philipossian, J. Electrochem. Soc., Vol. 142, No. 8, August 1998.

**Paragraph starting on page 4, line 21**

By way of comparison, the thickness of the oxide layer obtained under the same oxidation conditions on a similar silicon wafer that has not undergone ~~oxidation implantation~~ is 4.7 nm.

**Marked-Up Copy f the Amended Claims Showing Changes Made**

1. (Amended) A process for forming a silicon oxide layer of non-uniform thickness on a surface of one and the same silicon substrate, comprising:

- a) implanting in predetermined regions of the substrate ~~an effective dose of atoms of a chemical species at a concentration which increases the rate of oxidation of the substrate, wherein the chemical species comprises neon or helium;~~ and
- b) growing a silicon oxide layer of non-uniform thickness by oxidizing the surface of the substrate.

Please amend claim 7 as follows:

7. (Amended) The process as claimed in claim 6, wherein growing the silicon oxide layer comprises an oxidation step in a furnace at a temperature of at least 300°C and in an oxidizing atmosphere.